Mobile phone exposures in children

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W2F: Mobile Youth 2004
Your guide to developing mobile products for and marketing to Youth. 180 page report covering 38 countries. (£ 3995.00 purchase the report online)
"... the widespread use of mobile phones by children for non-essential calls should be discouraged. …“

justification of the precautionary approach:

- the developing nervous system (more vulnerable?)

- the greater energy absorption in the head (higher exposure per call?)

- a longer lifetime exposure (higher cumulative exposure?)
Three Questions

① Is there support for the assumption that today's children will have a higher cumulative exposure to radiowaves from mobile phones than today's adults when they are at their age?

② What are current patterns of use in children and are there typical characteristics of kids using mobile phones regularly?

③ What types of exposure are related to mobile telecommunications that are relevant for children?
Proportion of regular MP users over time among middle-aged persons

[Christensen et al., 2004]
Higher cumulative exposure?

Costs associated with the use of a mobile phone over the years (Germany, Year 2000 = 100)

[Federal Office of Statistics]
Higher cumulative exposure?

Number of public phones in Germany (1990 to 2003)
Higher cumulative exposure?

Proportion of regular MP users by age group

[Christensen et al., 2004]
Higher cumulative exposure? IMBEI

Number of calls per month

Minutes of MP use per day
Today‘s children will have a higher cumulative exposure because:

- they have a longer lifetime period of exposure

- they use mobile phones more often, because
  - the use of mobile phones gets cheaper and cheaper
  - mobile phones become more and more devices of everyday‘s life
  - children are very familiar with the technology

- mobile phones are particularly attractive for children; even if they don‘t use it for making calls, mobile phones offer a variety of other features
Current patterns?  
Typical characteristics?

% of MP owners among 15-19 years old

[Mobile Youth 2002 except * (survey)]
Current patterns? Typical characteristics?

MP use and ownership by age, Italy, 2002:

![Graph showing MP use and ownership by age in Italy, 2002. The graph includes data points for ages 5 to 13 years, with red and blue lines indicating usage and ownership respectively.]
Australian Kids Consumer Insights, 2/2003:

<table>
<thead>
<tr>
<th></th>
<th>Kids aged 6-9</th>
<th>Kids aged 10-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sometimes use a friend's mobile phone</td>
<td>6%</td>
<td>22%</td>
</tr>
<tr>
<td>Sometimes use their parent's mobile phone</td>
<td>93%</td>
<td>59%</td>
</tr>
<tr>
<td>Own their own mobile phone</td>
<td>5%</td>
<td>36%</td>
</tr>
</tbody>
</table>

Mobile phone ownership, all ages

Africa, 5/2004:
2.8% fixed-line customers compared to 6% mobile phone customers
annual increase of 65% over the last 5 years

China, 7/2002:
15% mobile phone customers, corresponds to 180 million people
Current patterns?  
Typical characteristics?

■ Studybase

Period: November 2002 – February 2003

Location: Mainz, Germany (city with about 200,000 inhabitants)

Population: All children in their fourth elementary school year (typically aged 9-10 years) in Mainz and near surroundings.

Participation: 1933 children from 34 primary schools (participation rate of 87.8%; 110 children did not attend school at the day of the interview, 158 children from 3 schools that refused participation).

Interview: standardized questionnaire with 14 easy-phrased questions, read out loud in class by a trained interviewer, teacher questionnaire

[Böhler, Schüz, in review]
Current patterns?
Typical characteristics?

Proportion of MP owners by school

Overall: 34.7%
Current patterns? Typical characteristics?

Mobile phone use for making calls:
- Daily: 6,4%
- Several times a week: 6,2%
- Rarely: 41,9%
- Never: 45,6%

Mobile phone use for sending text messages:
- Daily: 64,2%
- Several times a week: 25,8%
- Rarely: 3,7%
- Never: 6,2%
## Current patterns?

### Typical characteristics?

<table>
<thead>
<tr>
<th></th>
<th>MP ownership</th>
<th>MP regular use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing age</td>
<td>⇧</td>
<td>⇧</td>
</tr>
<tr>
<td>Being an only child</td>
<td>⇧</td>
<td>-</td>
</tr>
<tr>
<td>Watching TV (&gt;3 hrs/day)</td>
<td>⇧</td>
<td>⇧</td>
</tr>
<tr>
<td>Computer games (&gt;3 hrs/day)</td>
<td>⇧</td>
<td>⇧</td>
</tr>
<tr>
<td>Membership sport club</td>
<td>⇧</td>
<td>⇧</td>
</tr>
<tr>
<td>Picked up from school by car</td>
<td>⇧</td>
<td>-</td>
</tr>
<tr>
<td>Going to bed late</td>
<td>⇧</td>
<td>⇧</td>
</tr>
<tr>
<td>Foreign children in class (&gt;14)</td>
<td>⇧</td>
<td>-</td>
</tr>
<tr>
<td>Socially disadvantaged in class (&gt;14)</td>
<td>⇧</td>
<td>⇧</td>
</tr>
</tbody>
</table>

no impact: gender, attention of the class, private/state-run school, location
• The prevalence of mobile phone ownership and use is already very high among teens and increasing among younger children.

• There is variation across countries but a general trend of increasing mobile phone penetration.

• Due to the costs associated with the purchase and the use of a mobile phone, the finding of a high prevalence among children from socially disadvantaged families is rather surprising.
Types of exposure?

I – Radiowaves from mobile phones

Proportion of calls totally at highest power level: 31.1%
Highest variation with:
- network
- phone model

[ Berg et al., in press; Interphone Germany ]
3 Types of exposure?
II – ELF-EMF from mobile phones

[Data provided by Dr J Bowman, U.S. National Institute for Occupational Safety and Health (NIOSH); measurements supported by Interphone and NIOSH.]
Types of exposure?
II – ELF-EMF from mobile phones

• **source of ELF-MF**: during the pulsed transmissions from digital phones, a lot of current is drawn from the battery.

• **dominant frequency in GSM phones**: 217 Hz, the pulse rate.

• **variable field pattern around phones** from different makes; analog phones without pulses have much lower ELF emissions than digital phones.

• **magnitude of ELF-MF**
  
  own measurements: 0.2 – 0.8 μT

• due to the pulsed signal, magnetic fields from GSM phones have a time derivative dB/dt about 100 times greater than the derivative of power-frequency MF with the same magnitude; since dB/dt determines the electric fields induced in the brain, these emissions should be studied further.
Types of exposure?

III – Environmental exposures to radiowaves

[provided by Dr S Mann, NRPB]

Mobile phone base stations
• ecological study in the vicinity of Vatican Radio station
• sample measurements revealed E-fields of 2-20 V/m in a distance of 1-4 km
• increased childhood leukemia incidence within 4 km of the transmitters, but based on only 4 cases
• three further ecological studies on this subject with equivocal results

[Michelozzi, Am J Epidemiol, 2002]
Types of exposure?
III – Radiowaves from environmental sources

[Source: BAKOM]
• Mobile phones operate at maximum power in a relevant fraction of all calls

• Mobile phones can produce ELF-magnetic fields up to some $\mu$T

• Compared to emissions from mobile phones, exposures from other sources of radiowaves are very low; however, for young children, who use mobile phones rather sparsely, continuous exposures from sources like TV and radio transmitters may be relevant
• there is already a substantial proportion of children who use mobile phones regularly; among teens, the number of non-users is steadily decreasing towards a very minor fraction

• exposure assessment in epidemiological studies is easier than for adults, due to fewer competing exposure sources and less mobility, leading to less exposure misclassification for analyses

• today‘s children will have a much higher cumulative exposure than today‘s adults when they are at their age

• mobile phones are dominant sources of radiowave exposures and relevant sources of ELF-EMF